

records,  $dt/dh$  during an ascent is normally first negative and later positive. As a mathematician, I recognise, of course, that this implies either an absolute discontinuity—a rare event in nature—or else the existence of at least one surface where  $dt/dh$  is zero. In the latter event one would naturally expect  $dt/dh$  to be small for an appreciable distance on either side of the surface where it vanishes.

Coming now to Mr. Gold, if he will refer to my original letter (NATURE, March 12, 1908, p. 437) he will see that errors of  $\pm 10^{\circ}$  F. were not asserted to exist as a normal thing, but were suggested as a possible explanation of the following results, which had been quoted by Mr. W. H. Dines as recorded on one and the same occasion (November 11, 1907):—

Station	Height of "isothermal layer"	Temperature of "layer"
Ditcham Park	36,000 feet	$-42^{\circ}$ F.
Oxfordshire	38,500 "	$-58^{\circ}$ F.
Manchester	37,000 "	$-74^{\circ}$ F.

If Mr. Gold can suggest any other explanation likely to carry conviction to those who are sound in the stratospheric faith, I should be much interested to know what it is.

The figures quoted by Mr. Gold in his letter show that the examples which I had given of the differences between the temperatures recorded by two thermometers of different patterns sent up in the same balloon were not exceptional. Unless I misunderstand his figures, they signify that, taking two thermometers of different types, A and B, the reading from A is the higher when temperature rises and the lower when it falls. Taking both rising and falling readings, the average value of  $(A - B)$  max. in Mr. Gold's sixteen cases is  $3.2^{\circ}$  F. In one case it is  $6.3^{\circ}$  F. It must also be remembered, as explained in my last letter, that if  $A - B$  represents lag, it is likely to be an underestimate of the true error in the more sluggish thermometer. If we take the range of the algebraic difference  $A - B$  during the ascent and fall, Mr. Gold's figures give a mean of  $46^{\circ}$  F., the extreme value being  $83^{\circ}$  F.

The fact that on the average of all the readings, both rising and falling,  $A - B$  (or is it  $A - B$ ?) is small—on the mean of the sixteen cases almost exactly  $1^{\circ}$  F.—seems to be regarded by Mr. Gold as a great tribute to the accuracy of the instrument makers. This, however, does not necessarily follow, if—as I should naturally assume—the observers followed the procedure customary with meteorologists of applying to their readings before publication the corrections obtained by comparing the thermometers with some recognised standard. This, however, is perhaps hardly germane to the present discussion.

May 23.

C. CHREE.

#### An Optical Phenomenon.

I HAVE a greenhouse facing nearly due south. In a vertical pane of glass there is an imperfection. When the sun shines on this pane no light is transmitted through the imperfection. The result is that on a board or piece of paper held at right angles to the sun's rays there is produced an intense black disc about 1 inch in diameter, the board being held about 8 inches from the glass. This black disc is margined all round by a very narrow, brilliantly white line.

I can form no explanation of the phenomenon, for, so far as I can see, interference has no chance of acting. The glass is quite transparent, and the flaw so small that I could not find the cause of the black spot for some time. The disc is not hot.

So far as I can see, the glass is in tension round a central minute imperfection. By "sighting" the pane at various angles it is possible to detect certain lines. It is difficult, however, to get at them with any accuracy. There is no perceptible difference in thickness.

I cannot find any reference in any text-book to a pane of clear glass which absolutely intercepts the sun's rays in this way.

Can anyone give me an explanation of what appears to be a very unusual phenomenon?

V. P.

Crohill, Pendennis Road, Streatham, May 22.

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#### THE OLDEST REMAINS OF MAN.<sup>1</sup>

THE oldest remains of Man with which, until now, we were acquainted date back to the middle Pleistocene, to the Moustier period. They are represented by the cave reliefs from Neanderthal, Spy, Krapina, Naoulette, Malarnaud, and possibly Mentone, by the drift reliefs from Galley Hill and Bury St. Edmunds. In the memoir under notice, however, we have the description of the two halves of a lower jaw for which a much higher antiquity is claimed.



FIG. 1.—Mandible seen from the side.

They are attributed to the earliest Pleistocene or even to the late Pliocene.

The jaw, which, fortunately, contains its complement of teeth, was found 24'10 metres below the surface in a deposit of sand at Mauer, 10 kilometres south-east of Heidelberg. The date of the discovery was October 21, 1907.

When found, the two parts were thickly coated by the deposit in which they lay; the left half had a piece of limestone firmly cemented to it, both jaw and stone being similarly marked by dendritic deposits of iron and manganese. The sand in which the jaw



FIG. 2.—Mandible seen from above.

was found is of the same age and nature as the sand of Moßbach, and is attributed to the earliest Pleistocene, although the remains of the fauna found within it justify us to some extent in ascribing it to an epoch even more remote—the period of the Cromer Forest Bed in England, the late Pliocene of South Europe. The fauna includes, among many species distinctly diluvial, *Rhinoceros etruscus*, *Falc.*, a horse

<sup>1</sup> "Der Unterkiefer des Homo Heidelbergensis aus den Sanden von Mauer bei Heidelberg." Ein Beitrag zur Paläontologie des Menschen von Otto Schoetensack. Pp. iv+67; 13 plates. (Leipzig: W. Engelmann, 1908.) Price 14 marks.

intermediate between *Equus stenonis*, Cocchi, and the Taubach form, and *Elephas antiquus*.

A full description of the site and of the manner in which the discovery was made, with a careful compilation of the animals the remains of which have been found in the deposit, constitute the first portion of the book. Two other parts are concerned with the remains themselves, viz. with the jaw and with the teeth. The latter are typically human, and permit of no doubt as to the mandible being that of a man. The canines are not unduly prominent, while the dimensions of the teeth are within the variation limits of living man. The most striking features of the jaw, which, it may be said, was divided into two parts by the spade of a workman, are the absence of a chin, the thickness of the body, the width of

process is chiefly remarkable for the large size of its articular facet.

The lower border of the mandible passes backwards and only slightly outwards from the symphysis to the junction of body and ramus, where it suddenly takes a more outward curve. The border thus has a contour not unlike that of a trefoil window.

Comparisons are made between the Heidelberg jaw, those of Spy and Krapina, and, in addition, those of recent Australians and Negroes. The author concludes that the Heidelberg specimen surpasses all in its combination of primitive characters, that it is a generalised type from which all jaws, ancient and recent, can be readily derived, that the Spy mandibles resemble it most, the Krapina examples exhibiting marked but mere individual variations.

As to the teeth, all the molars are quinquecuspid; the second molars are the largest; the first and third molars are of equal size. Certain teeth were fractured by the spade, the pulp cavity being laid open. It was possible to measure the diameters of the pulp cavity and the thickness of the wall in the case of the premolars and first two molars of the left side; these measurements were considerably in excess of those which obtain in recent Europeans. The jaw was, further, Röntgen-rayed, little additional information being, however, supplied.

The figures, which are mainly photographs, number forty-eight, and are disposed on thirteen plates. They leave nothing to be desired.

The whole volume reflects the greatest credit on Dr. Otto Schoetensack. Anthropologists are to be congratulated that the work of describing what there is every reason for thinking are the oldest remains of man fell into such capable hands.

WILLIAM WRIGHT.

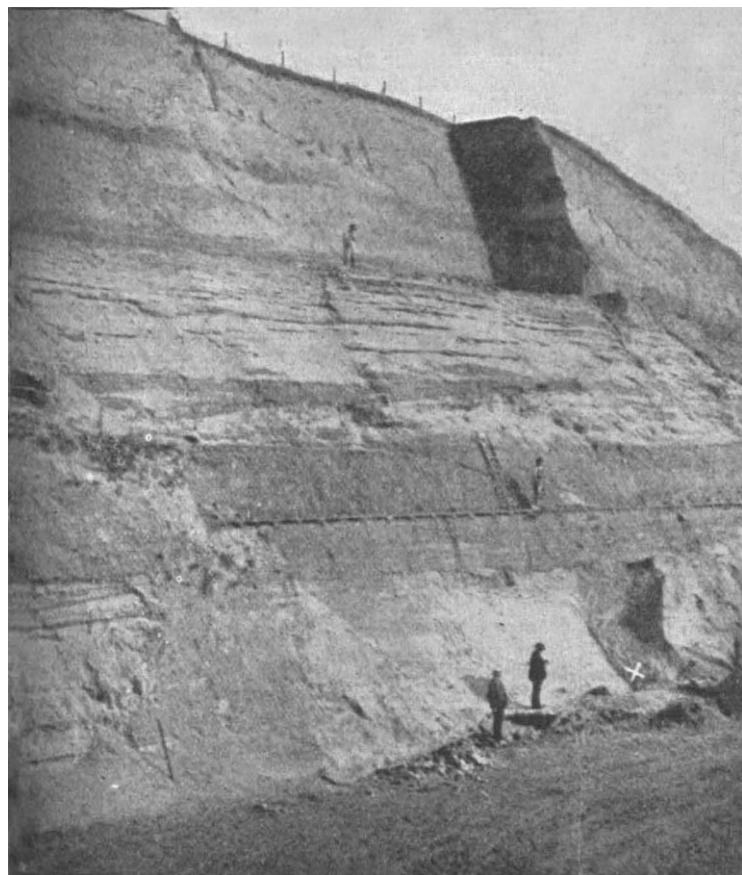


FIG. 3.—Position in which the mandible was found, Mauer, near Heidelberg.

the ascending ramus, and the low level of the coronoid process. Correlated with the absence of a chin is a well-marked incisura submental, the lower border of the symphysis being 50 mm. above that of the lateral portion of the body. The sulcus supramarginalis, interdigastic spine, trigonum postmolare, and praecoronoid fossa recognised by Klaatsch in Australian mandibles are also apparent in the specimen. A small tubercle lies immediately below the mental foramen; a similar excrescence has been noted by Gorjanović-Kramberger in the jaw fragment Krapina H and by Klaatsch in recent Australians. The geniohyoglossus muscle arose from a groove, the genio-hyoid from a rounded prominence.

The width of the ascending ramus is 60 mm. The coronoid process is blunt and rounded. The condyloid

others being men of conspicuous eminence in business and finance. In 1906 the trust was incorporated by charter under the title of the Carnegie Foundation for the Advancement of Teaching. In his deed of gift the donor stated that the fund was to be applied without regard to race, sex, creed, or colour. He did not "presume to include," among the institutions which were to benefit, State-supported universities or colleges on the ground that "they might prefer that their relations should remain exclusively with the State." In response, however, to the desire of the professors in State universities, expressed through their National Association, Mr. Carnegie in March, 1908, increased his original gift by 1,000,000.

<sup>1</sup> The Carnegie Foundation for the Advancement of Teaching. Third Annual Report of the President and Treasurer, October, 1908.